Ministry of Environment and Energy

FOR YOUR **information**

FEBRUARY 1995

Final clean water regulations released for organic chemical manufacturing and inorganic chemical sectors

On Feb. 14, 1995, Ontario released final clean water regulations to protect provincial waterways from pollutants discharged by the organic chemical manufacturing (OCM) and inorganic chemical (IC) sectors.

The clean water regulations establish limits for pollutants discharged by manufacturing plants in the two sectors. They are designed to reduce significantly the amount of toxic and other pollutants entering Ontario's waterways from these plants.

The OCM and IC sectors are two of the largest users of water in Ontario. Water is used mainly for cooling, but significant quantities are also used for process purposes.

Reducing the quantity of toxic chemicals discharged in effluents from the organic and inorganic chemical sectors will reduce the risks posed to the environment, human health, fish and wildlife. The clean water regulation limits also will help the ministry implement initiatives such as the Canada-Ontario Agreement respecting Great Lakes Water Quality, the Remedial Action Plan program and the Lake Ontario Toxics Management program.

The regulations were developed under the Municipal-Industrial Strategy for Abatement (MISA) program.

THE ORGANIC CHEMICAL MANUFACTURING SECTOR AT A GLANCE

Companies in the organic chemical manufacturing sector make a variety of products, including plastics, fibres, synthetic rubber, detergent bases, industrial solvents and gasoline additives.

The OCM sector employs about 9,800 people at 26 plants. The plants are distributed mainly along the Great Lakes Basin:

Area	Number of plants
Sarnia	10
Kingston/Cornwall	7
Toronto/Durham	3
Niagara	2
Cobourg	1
Arnprior	1
Elmira	1
Longford Mills	1

Plants in the OCM sector discharge into the St.Clair River, Niagara River, St.Lawrence River, Ottawa River, Grand River, Lake Ontario and Lake St. John.

Major companies in the sector include Dow Chemical Canada Inc., Dupont Canada Inc., Imperial Oil Chemicals Division, BASF and Polysar Rubber Corporation.

THE INORGANIC CHEMICAL SECTOR AT A GLANCE

Companies in the inorganic chemical sector produce fertilizers, abrasives, carbon black, mineral-based insulating materials, industrial gases, acids and explosives.

Ontario

PIBS 1706E

The IC sector employs about 3,000 people at 25 plants:

Area	Number of plants
Sarnia	7
Niagara	6
Cornwall/Maitland	5
Port Maitland	2
Sault Ste. Marie	1
North Bay	1
Hamilton	1
Amherstburg	1
Elmira	1

Plants in the inorganic chemical sector discharge into the St.Mary's River, St.Clair River, Detroit River, Niagara River, St. Lawrence River, Grand River, Lake Erie, Lake Ontario and Lake Nipissing.

Major companies in the sector include: ICI Canada, Terra Industries Inc., General Chemical Canada Ltd. and Nutrite Inc.

ESTIMATED COSTS OF IMPLEMENTING THE REGULATIONS

The estimated capital cost of compliance with the limits for the organic chemical manufacturing sector is $51.6 million, with an annual operating cost of $16.1 million.

The estimated capital cost of compliance with the limits for the inorganic chemical sector is $16.9 million, with an annual operating cost of $1.85 million.

GOAL OF CLEAN WATER REGULATIONS

The goal of Ontario's clean water limits regulations is the virtual elimination of persistent toxic substances from effluents discharged into Ontario's waterways. The program was introduced in 1986 to identify and reduce the pollutants discharged from industrial and municipal sources into Ontario's rivers and lakes.

The first phase of the program -- monitoring the effluents from 300 major industrial direct dischargers -- was completed in August 1991. In September 1991, the Ministry of Environment and Energy published the Issue Resolution Final Report which defined concepts crucial to the development and implementation of the clean water limits regulations. At the same time, the ministry introduced a new direction for the program which included:

- the identification of pollution prevention as the preferred approach to achieve the virtual elimination of persistent toxic substances
- the establishment of effluent limits for a list of sector-specific parameters
- the establishment of a ban or phase-out list for specific persistent toxic substances
- the requirement that final effluents cannot kill fish or water fleas as measured by standardized tests

The second phase of the program -- establishing regulations that set effluent limits for industrial sector dischargers -- is nearing completion. Regulations have been finalized for seven of the nine MISA industrial sectors.

REDUCTION OF LOADINGS

The limits in the regulations are expected to reduce discharges of toxic chemicals of concern by almost 50 per cent from the OCM sector and by about 16 per cent from the IC sector.

These chemicals include seven contaminants on the ministry's list of candidate substances for bans, phase-out or reduction: arsenic, mercury, 1,4-dichlorobenzene, phenanthrene, hexachlorobenzene, PCBs (polychlorinated biphenyls) and polychlorinated dioxins and furans.

Estimated reductions of conventional pollutants -- including total suspended solids, phosphorus, nitrogen compounds, and oil and grease -- for the OCM and IC sectors are 43 per cent and 22 per cent respectively.

THE MAJOR ENVIRONMENTAL CONCERNS

Some wastewaters from the organic chemical manufacturing and inorganic chemical sectors contain persistent toxic chemicals such as chlorinated solvents, polychlorinated dibenzodioxins and dibenzofurans, polychlorinated biphenyls (PCBs) and heavy metals such as mercury, nickel, zinc and chromium. The wastewaters also contain conventional pollutants such as suspended solids, phosphorus and nitrogen compounds which could impair the uses of receiving waters.

Persistent toxic chemicals including heavy metals can accumulate in sediments on the bottom of a body of water and can be harmful to human health, fish, aquatic plants and other aquatic life. These chemicals have been linked to cancers and birth defects in humans.

ESTABLISHING THE DISCHARGE LIMITS

The clean water limits in the regulation are based on the results of a 12-month monitoring program and an examination of the best available technology (BAT) for reducing the discharge of contaminants in each sector.

The ministry defines BAT as a combination of demonstrated treatment technologies and industrial process changes that can reduce or eliminate pollution and are affordable to the industry. To determine BAT, the ministry hired consultants to conduct a world-wide search for modern wastewater treatment practices and process technologies applicable to the two sectors.

Regulated plants are free to choose how they meet the limits. For example, rather than installing end-of-pipe treatment, companies may choose to implement pollution prevention measures.

A description of the available technologies for the two sectors are contained in the BAT consultant's report.

The OCM and IC sector clean water regulations will result in the application of legally enforceable limits across the province.

REGULATED REQUIREMENTS

Because of the product and process diversity in the two sectors, each plant has a site-specific set of limits for the parameters of concern at the site.

Sector-wide parameters that are limited at every OCM sector plant are dissolved organic carbon (DOC), phosphorus, total suspended solids, phenolics, and oil and grease.

Similarly, for the IC sector, total suspended solids, DOC and phosphorus are limited at each plant.

All final discharges at all plants must not kill fish or water fleas (as demonstrated by a standard acute lethality test) and must be within a pH-range of 6.0 to 9.5 at all times.

All plants must ensure that their wastewaters meet the following concentration limits for polychlorinated dioxin and furan groups:

- < 20 picograms/L for 2,3,7,8-tetrachlorodibenzo-p-dioxin
- < 50 picograms/L for 2,3,7,8-tetrachlorodibenzofuran
- For 17 other types of 2,3,7,8-substituted dioxins and furans, the total toxic equivalent (TEQ) must be $\leq$ 60 picograms/L

A listing of the 17 other types of dioxins and furans and the method for calculating their total toxic equivalent concentration are described in the Sampling and Analytical Protocol (Ministry of Environment and Energy, ISBN 0-7778-1880-9, August 1994).

COMPARISON TO OTHER JURISDICTIONS

The limits for the organic chemical manufacturing sector were reviewed against limits or guidelines of other jurisdictions including other Canadian provinces, the United States and Europe. The Ontario limits were found generally to be more stringent.

APPLYING THE DISCHARGE LIMITS

There are two general approaches to reducing the quantities of pollutants in plant effluents: in-plant pollution prevention and end-of-pipe treatment.

In-plant pollution prevention consists of process modifications, chemical substitution and water reduction and recycling. In the organic chemical manufacturing sector, for example, one plant has replaced the harmful chemical benzene which was used as a solvent, with the less harmful chemical cyclohexane.

In-plant recycling of wastewaters is becoming a common practice in industry. Typically, pollutants can be removed from wastewaters by treatment such as filtration and the cleaned-up water can be re-used in the process.

End-of-the-pipe treatment processes commonly used in these two sectors to improve effluent quality include filtration or sedimentation, biological treatment and activated carbon adsorption.

In addition to limits on specific parameters, plants in the OCM and IC sectors are required to monitor cooling waters, conduct chronic toxicity tests on final effluents and carry out storm water control studies.

The regulations also incorporate a number of standard monitoring and reporting requirements (in common with clean water regulations for the other MISA sectors). Sections of the regulations govern: compliance monitoring, the location of sampling points, sampling and analytical procedures, toxicity testing, the calculation of loadings, effluent flow measurement, quality control, record keeping and reporting to the ministry and to the public.

HOW THE REGULATIONS WERE FINALIZED

The regulations were finalized following a 60-day public comment period. Consultations were held with affected plants and trade unions, as well as with First Nations representatives. The draft regulations were also reviewed by the MISA Advisory Committee, which is made up of environmental experts from academia, industry and public interest groups.

PENALTIES FOR VIOLATIONS

Corporations not complying with clean water regulations can be subject to a maximum fine of $50,000 per day for a first conviction and $100,000 per day for subsequent convictions.

WHERE TO GET MORE INFORMATION

Copies of the regulations for the organic chemical manufacturing (PIBS #407-EO2) and inorganic chemical (PIBS #522-EO2) sectors can be obtained by calling the Ministry of Environment and Energy's Public Information Centre at (416) 323-4321 or 1-800-565-4923.